

## United States of America

### DRAFT PROPOSAL FOR THE WORK OF THE CONFERENCE

**Agenda Item 1.37:** to consider the regulatory and technical provisions for satellite networks using highly elliptical orbits (HEOs);

**Background Information:** The ITU-R has been considering the sharing aspects of HEO satellite systems (occasionally referred to as “quasi-geostationary” systems) in a number of contexts over the last several years.

A subcategory of non-geostationary (non-GSO) systems, HEO systems are intended for operation or are already operational in several fixed-satellite service (FSS) bands above 3 GHz. In certain configurations, HEO systems potentially facilitate the introduction of large numbers of co-frequency non-GSO FSS systems and promote successful co-existence with GSO networks and terrestrial systems.

To date, several categories of orbits that are encompassed within the term “highly-elliptical” have been identified within the ITU-R. All highly-elliptical orbits, however, are non-geostationary orbits, and all HEO systems are non-geostationary systems. In this regard, recent studies in certain frequency bands between 10 and 30 GHz resulted in a series of new regulations in Articles **21** and **22** that were adopted at the 1997 and 2000 WRCs, including pfd limits on non-GSO FSS systems to protect terrestrial systems and epfd limits on non-GSO FSS systems to protect GSO FSS and broadcasting-satellite service (BSS) networks. The pfd and epfd limits and associated provisions that were imposed on non-GSO FSS systems in the applicable segments of the 10-30 GHz band apply to non-GSO FSS systems in highly-elliptical orbits.

Five of the six following proposals under agenda item 1.37 are intended to avoid any potential confusion regarding the applicability of regulations in Articles **21** and **22** that were adopted at WRC-2000 to all non-GSO systems, including those employing highly-elliptical orbits, and to confirm the ITU-R conclusion that no change is needed to Article **1**, Article **5**, or Article **22** in order to accommodate non-GSO systems using highly-elliptical orbits. The sixth proposal, for pfd limits at 3.7-4.2 GHz for non-GSO satellites, results from the fact that studies of the pfd values that adequately protect the FS in the 3.7-4.2 GHz band from satellites in highly-elliptical orbits are of sufficient maturity in the ITU-R to enable pfd limits to be established that would protect the FS from HEO emissions, as well as from other types of non-GSO FSS satellite emissions. No other changes to Section V of Article **21** are needed.

**Proposals:**

USA/ /1      NOC

#### ARTICLE 1

##### Terms and definitions

**Reasons:** Satellite networks using HEOs should continue to be considered as non-GSOs so there is no need to modify the terms and definitions in the Radio Regulations to accommodate HEO-type non-GSO operations.

## ARTICLE 5

**Frequency allocations**

**Reasons:** Satellite networks using HEOs should continue to be considered as non-GSOs and these networks should continue to be considered to have the same regulatory standing as other types of non-GSOs, such as MEOs and LEOs.

TABLE 21-4 (WRC-2000)

Frequency band	Service*	Limit in dB(W/m <sup>2</sup> ) for angle of arrival (d) above the horizontal plane			Reference bandwidth
		0°-5°	5°-25°	25°-90°	
* * *					
3 400-4 200 MHz 4 500-4 800 MHz 5 670-5 725 MHz (Nos. <b>5.453</b> and <b>5.455</b> ) 7 250-7 850 MHz	Fixed-satellite (space-to-Earth, <u>geostationary-satellite orbit</u> ) Meteorological-satellite (space-to-Earth) Mobile-satellite Space research	-152	-152 + 0.5(δ - 5)	-142	4 kHz
<u>3 700-4 200 MHz</u>	<u>Fixed-satellite (space-to-Earth, non-geostationary-satellite orbit)</u>	<u>-160</u>	<u>-160 + 0.5(δ - 5)</u>	<u>-150</u>	<u>4 kHz</u>
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**Reasons:** The FS in the 3.7-4.2 GHz band would be adequately protected by the adoption of limits on pfd produced by highly-elliptical orbit non-GSO satellites. As the levels would also adequately protect the FS from other types of non-GSO satellites, they are proposed for application to all non-GSO FSS satellites, in order to avoid having to introduce a definition of HEO satellites or otherwise subcategorize non-GSO satellites. The levels for non-GSO FSS satellites have been converted to a 4 kHz reference bandwidth from the levels of -126/-136 dB(W/m<sup>2</sup>) in 1 MHz that are reflected in the CPM Report.

TABLE 21-4 (continued)

Frequency band	Service*	Limit in dB(W/m <sup>2</sup> ) for angle of arrival (d) above the horizontal plane			Reference bandwidth
		0°-5°	5°-25°	25°-90°	
* * *					
10.7-11.7 GHz	Fixed-satellite (space-to-Earth), non-geostationary-satellite orbit	−126	−126 + 0.5(δ − 5)	−116	1 MHz
11.7-12.5 GHz (Region 1) 12.5-12.75 GHz (Region 1 countries listed in Nos. <b>5.494</b> and <b>5.496</b> ) 11.7-12.7 GHz (Region 2) 11.7-12.75 GHz (Region 3)	Fixed-satellite (space-to-Earth), non-geostationary-satellite orbit	−124	−124 + 0.5(δ − 5)	−114	1 MHz
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17.7-19.3 GHz <sup>7, 8</sup>	Fixed-satellite (space-to-Earth) Meteorological-satellite (space-to-Earth)	−115 <sup>12bis</sup> or −115 − X <sup>12</sup>	−115 + 0.5(δ − 5) <sup>12bis</sup> or −115 − X + ((10 + X)/20)(δ − 5) <sup>12</sup>	−105 <sup>12bis</sup> or −105 <sup>12</sup>	1 MHz
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**Reasons:** The current limits and associated provisions in Section V of Article 21 that were finalized at WRC-2000 for all non-GSO FSS systems in certain bands between 10 and 30 GHz apply in full to non-GSO FSS systems in highly-elliptical orbits. No additional regulatory provisions are needed for HEO systems in these bands.

## ARTICLE 22

Space services<sup>1</sup>

## Section II – Control of interference to geostationary-satellite systems

**Reasons:** The current limits and associated provisions in Section II of Article 22 that were finalized at WRC-2000 for all non-GSO FSS systems in certain bands between 10 and 30 GHz apply in full to non-GSO FSS systems in highly-elliptical orbits and are necessary for the protection of co-frequency GSO FSS and BSS systems. No additional regulatory provisions are needed for HEO systems in these

bands, and no lessening of the protection required by GSO systems in the same bands should be considered at WRC-03.

USA/ /6      NOC

## RESOLUTION 76 (WRC-2000)

### **Protection of geostationary fixed-satellite service and geostationary broadcasting-satellite service networks from the maximum aggregate equivalent power flux-density produced by multiple non-geostationary fixed-satellite service systems in frequency bands where equivalent power flux-density limits have been adopted**

**Reasons:** The current provisions in Resolution **76 (WRC-2000)** for protection of GSO FSS and BSS networks from the maximum aggregate epfd produced by multiple non-GSO FSS systems in certain bands between 10 and 30 GHz apply in full to non-GSO FSS systems in highly-elliptical orbits and are necessary for the protection of co-frequency GSO FSS and BSS systems. No additional regulatory provisions are needed for HEO systems in these bands, and no lessening of the protection required by GSO systems in the same bands should be considered.

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